

The Canadian Entomologist

VOL. LVIII.

ORILLIA, MARCH, 1926.

No. 3

THE "DRUMMING" OF STONEFLIES (PLECOPTERA).

BY CHARLES MACNAMARA,

Arnprior, Ontario.

Our house is on the bank of the Madawaska River in the town of Arnprior, Ontario, and although the windows and doors are kept well screened in summer, many aquatic insects find their way in. Excepting a few mosquitoes, they are all harmless, and as an entomologist, I find them interesting and entertaining, although the rest of the family do not seem to enjoy them so much. The majority of the visitors are caddis flies (Trichoptera), most of them so minute that they can pass through the meshes of the window screens. Attracted by the lights at night, they come into the house in considerable numbers. Along with these are usually a few stoneflies (Plecoptera) which must insinuate themselves through crevices, for they are much too large to pass through the screens. One species in particular is about an inch and a half long. This is a flat narrow insect of a secretive habit. It peers furtively from behind a book or over the edge of a shelf, and then makes a fluttering dash at the light, only to drop suddenly and scurry off into hiding again.

When in the dark this insect is given rather infrequently to drumming on the surface on which it is resting. I have heard the noise on six or eight occasions, but supposing that the experience was a common one, I took no trouble to identify the species. Dr. J. G. Needham of Cornell University tells me, however, that while reference was made to the practice as long ago as 1851 (Newport, Trans. Linn. Soc. Lond.) very little has been published about it.

The drumming I have heard has always occurred either in a dark corner of the room or after the lights were out. A typical performance, which I noted down at the time, took place between ten and eleven o'clock on the night of the 11th July, 1924. It was a rapid tattoo, the beats almost running into one another: "g-r-r-r-r," continued for about three seconds, a pause of about two seconds and a short "g-r-r" of about one second. This "phrase" was repeated six or seven times in the course of ten or fifteen minutes. On other occasions the noise was a single "g-r-r-r" for two or three seconds without the pause and short repetition.

The sound is fairly loud, and in the silence of the night could be heard, I should think, at a distance of 15 or 20 feet, and perhaps farther. One of the insects once discovered a large paste-board portfolio leaning against the wall, and on this resonant surface his tattoo was particularly loud. Usually they drummed on the baseboard of the room. Apparently they make the noise only in the dark, and when I turned a flash light on them the sound ceased. Thus I never actually caught them at it, but there is no doubt the sound is produced by rapping with the extremity of the abdomen on the surface the insect is standing on. Dr. Needham refers me on this point to the recently published "Monograph of

the Stoneflies" by himself and Dr. Claassen, where he writes, page 28: "The prolonged ninth abdominal sternite bears on its under side a roundish percussion disc or hammer with which the male is said to drum on the surface on which he stands." Thirty beats per second sound to the average ear as a continuous note, so the stonefly's strokes must have a frequency slightly less than this, as they almost coalesce but not quite.

The "percussion hammer" on the ninth abdominal segment occurs in at least five genera of stoneflies, Dr. Needham says. From this it would seem that the habit of drumming, although it has seldom been recorded, cannot be very uncommon. Mr. Norman Criddle tells me that a neighbor of his in Treesbank, Manitoba, who lives near the river, complained last summer of the rapping noises made by stoneflies on the walls of his house.

DESCRIPTIONS OF NEW ICHNEUMON-FLIES FROM CANADA.*

BY H. L. VIERECK,

Ottawa, Ont.

***Neostricklandia sericata* Viereck.**

Since the publication of the description (1925, Can. Ent., LVII, 75) of *Neostricklandia sericata* Vier., the male has been found.

Male. Length 8.5 mm.; differs from the descriptions of the female chiefly as follows:—Malar line is to width of mandibles at base nearly as 5 is to 5, antennae 24-jointed, first joint of the flagel a little longer than the second, penultimate joint nearly twice as long as thick; ramellus midway between the transverse cubitus and the discoidal vein, disc of scutel black, base of mid and hind femora also reddish, extensor side of fore tibiae darkened; mid and hind tibiae reddish near the spurs, elsewhere mostly blackish, hind coxae blackish above, median longitudinal carinae partly developed, tergites blackish throughout, dorsal carinae extending well beyond the spiracles of the first tergite and nearly to the end.

In the additional specimens there is a tendency toward the same coloration of the tergites as in the type. The smallest individual is barely 7 mm. long. Husavick, Man., Aug. 23, 1910, (J. B. Wallis).

***Cerobracon* new genus.**

Scape simple, not much longer than thick, pedicel shorter than scape, first and second and in some species the third joint of the flagel also produced at the apex beyond the outside line of their base and the rest of the flagel. Head cubical. Otherwise as in *Monogonogastra* Viereck.

Genotype—*Bracon secundus* Dalla Torre. To this genus also belong *B. rufovariegatus* Provancher and *B. vancouverensis* Dalla Torre.

***Cerobracon vancouverensis* Dalla Torre.**

The specimen in the Provancher collection designated as type of this species by Gahan and Rohwer does not agree with the original description. The true type is in the second Provancher collection, mounted on a short pin bearing a white label No. 429 and a yellow label No. 1666. This agrees with the original description except that the color of the head is yellowish rather than reddish. Like *C. secundus* D.T. this has only the first and second joints of the flagel

*—Contribution from the Division of Systematic Entomological Branch, Department of Agriculture, Ottawa, Canada.

produced at apex. Second tergite with a narrow median embossed area, lateral depressions instead of furrows, striae between these depressions confined to basal two-thirds of tergite, third tergite with a few striae at base but no tangible median embossed area.

Arichelonus secundus n. sp.

Female. Length 4 mm.; black or blackish except mandibles, part of legs and two discal confluent or separate spots in the middle of the apex of the basal third of the carapace. Face rather finely rugulose, shiny, clypeus partly polished and rather closely punctured, vertex sculptured much like the face, antennae 28-jointed; notauli deeply impressed, scutellum finely punctured, almost impunctate, legs black or blackish except for the joints beyond the coxae, the femora and rest of legs which are more or less pale brownish to yellowish-brown, veins of basal half of wings pale, of apical half dark, stigma and costa mostly black or blackish; propodeum reticulated, shiny, with two median longitudinal carinae and a transverse carina, the lateral prominences rather rounded; carapace sculptured all over, the basal two-thirds conspicuously longitudinally ridged and reticulated, the apical third somewhat compressed and rather weakly reticulated.

Holotype—♀, Midday Val., Merritt, B. C., July 12, 1922, No. 1705, lot 585, *Pinus ponderosa*, (N. Cutler); No. 824 in the Canadian National Collection.

Paratypes—2 ♀, same data as the holotype but with lot numbers 584, 587, and dates July 11 and 14 respectively.

Glypta (Glypta) rosaceanae new species.

Related to *G. simplicipes* Cresson.

Female.—Length 10 mm.; black, clypeus yellowish except at base and across the apical beveled margin, basal half of mandibles yellowish, the apical half mostly brownish and blackish, front hardly produced medially, tegulae pale stramineous, scape and pedicel blackish, flagel brownish to blackish; hind angle of propodeum, tegulae and wing bases yellowish, legs including coxae reddish excepting end joint of mid tarsi, all of hind tarsi and apical third of hind tibiae all of which are blackish, recurrent vein branched above the middle, the branch hardly as long as the cubital abscissa between the transverse cubitus and the recurrent vein.

Otherwise agrees well with the original description of *G. simplicipes* Cress.

Male.—Characters essentially as in the female, but fore and mid coxae and trochanters yellowish.

The branch to the recurrent vein wanting in some specimens but then represented by a pigmented spot on the vein.

Holotype—♀, Vernon, B.C., June 17, 1924, (E. A. Rendell).

Allotype—♂, June 12, 1924, otherwise with the same data as the type.

Paratypes—♀ ♀ and ♂ ♂, June 16, 17, otherwise with the same data as the type.

Aplomerus decorus new species.

Related to *A. tibialis* Provancher.

Female. Length 11 mm.; sheaths of the ovipositor 10 mm.; anterior edge of the clypeus feebly toothed in the middle, face, except at the eye margin, nearly as closely punctured as possible with punctures of at least two sizes,

along the eye margin the punctures of the face are widely separated, front punctured, the punctures a little more separated than along the eye margin of the face, punctures of vertex sparser than on the front, temples and cheeks more closely punctured than the front, no fovea in front of the fore ocellus, pronotum mostly rugoso-punctate, partly distinctly, closely punctured, fore part of prescutum finely, closely punctured, the remainder nearly impunctate, scapulae punctured along the fore and side margin, posteriorly almost impunctate, notauli foveolate, fore fossa of scutellum furrowed and punctured, scutellum nearly impunctate, metapleura wrinkled; basal area nearly triangular, the areola and petiolarea virtually confluent, costulae incomplete; first tergite longitudinally and obliquely striate except at apex, the second tergite striate in much the same way but with the sculpture finer, third tergite transversely striate, the remaining tergites finely sculptured. Black, legs throughout, first, second and all but apical fourth of third abdominal segments more or less dark stramineous, wings darkened and with blackish stramineous veins, discocubital vein with a branch extending downward and outward.

Holotype—♀, Ft. Coulonge, Quebec, July 8, 1917, (J. I. Beaulne); No. 1562 in the Canadian National Collection, Ottawa.

FURTHER NEW DOLICHOPODIDAE IN THE CANADIAN NATIONAL
COLLECTION (DIPTERA).

BY M. C. VAN DUZEE,
Buffalo, N. Y.

***Psilopus fuscinervis* n. sp.**

Male. Length 3.5 mm., of wing 3.2 mm. Face green, covered with white pollen. Palpi and proboscis yellow, the former with several long black hairs. Front violet in the center, green on the sides, with only a little white pollen just above the antennae. First two antennal joints yellow, third brown, small; second joint with small bristles; arista dorsal, brown, nearly as long as the height of the head. Lower orbital cilia short, white.

Thorax shining green, its posterior slope and the scutellum more or less blue, its bristles short; scutellum with two bristles; pleura dulled with white pollen. Abdomen green, venter, narrow edge of base and narrow hind margins of first four segments yellow, this yellow extending to the middle of the second and third segments on the sides; first segment with two long, slender, black bristles on each side; other segments with short bristles on the hind margin and short, black hair. Hypopygium small, with a pair of narrow, yellow lamellae, fringed with yellow hair, and a yellow organ projecting downward, each of these nearly as long as the height of the end of the abdomen; hairs on the venter yellow.

Coxae, femora, tibiae and tarsi yellow, tips of the tarsi darker; all hairs and bristles of the coxae yellow; femora nearly bare, but with a few minute pale hairs, those near the tip more blackish; hairs of the tibiae and tarsi black; tibiae without bristles; fore tibia 69, middle ones 95, posterior pair 121 fiftieths of a millimeter long; fifth joint of fore and middle tarsi a very little widened. Joints of fore tarsi as 93:25:16:11:5; of middle ones as 90:31:25:12:7; and of posterior pairs as 72:26:16:10:7. Calypters and halteres yellow, the former with narrow brown margin and white cilia.

Wings nearly hyaline, veins blackish, only slightly yellow at root of wing; section of fourth vein from the cross-vein to the bend 34, from bend to wing margin on lower fork 20 fiftieths of a millimeter; last section of fifth vein 13, cross-vein 31 fiftieths of a millimeter long.

Female. Color about as in the male, except that the dorsum of the abdomen is usually green with a yellow base on second dorsal segment; sixth and seventh segments brown, but not always visible. Legs as in the male, except that all fifth tarsal joints are cylindrical and the middle tibiae have a small bristle near their base. Length of fore tibiae 70, middle tibiae 90 and posterior ones 116 fiftieths of a millimeter. Joints of fore tarsi as 64:27:17:11:6; of middle ones as 78:28:17:10:5; and of posterior pair as 52:27:17:12:7. Calypters as in the male. Fourth vein from the cross-vein to its bend 33, lower fork from bend to wing margin 21 fiftieths of a millimeter; last section of fifth vein 14, cross-vein 27 fiftieths of a millimeter long.

Described from six males and eleven females; all taken by G. S. Walley, at Point Pelee, Ontario, July 16-25, 1925.

Holotype, ♂, No. 1959 in the Canadian National Collection, Ottawa.

This is very much like *flavicornis* Aldrich but it is a little larger, has the wing veins blackish and the posterior tarsi a very little longer than their tibiae. In *flavicornis* the posterior tarsi are only four-fifths as long as their tibiae and the wing veins are wholly yellow. As *flavicornis* was described from a female only, the above comparison is made with the female of *fuscinervis*.

***Parasyntormon rotundicornis* n. sp.**

Male. Length 2 mm. Face very narrow, white. Front brown. Antennae blackish; first and second joints yellow below; third joint rounded, about as long as wide; arista inserted near the base of third joint, much longer than the antenna.

Dorsum of thorax metallic brown with green reflections, dulled with brown pollen; posterior edge of pleura yellow. Abdomen bronze brown, venter and most of the sides of second, third and fourth segments yellow. Hypopygium black, with narrow brown lamellae, fringed with long hair; a thick, black, central organ as long as the lamellae and enlarged at tip and a pair of blunt bristles which are placed on the posterior margin of fifth ventral segment (these last are not visible in all specimens but are usually very conspicuous).

Coxae, femora and tibiae yellow, posterior femora and tibiae usually brownish; tips of fore coxae and lower surface of anterior femora with slender black bristles. Fore and middle tarsi yellow, becoming brown at tip; posterior pair mostly blackish, fore tarsi formed about as usual in the genus, first joint with three bristles on basal third, second swollen below, third with a hooked bristle at base; fore tibiae 31 fiftieths of a millimeter long. Joints of fore tarsi as 19:8:6:5:5; of middle ones as 27:14:10:7:6; and of posterior tarsi as 15:21:18:8:7. Calypters, their cilia and the halteres yellowish.

Wings grayish; third and fourth veins parallel beyond the cross-vein, last section of fifth vein 29, cross-vein 9 fiftieths of a millimeter long.

Female: Colored as in the male, except that the abdomen has a little more yellow on the sides. The face is a little wider; the last antennal joint is

often largely yellow. Fore tarsi plain; anterior femora without bristles below; joints of fore tarsi as 19:11:8:7:7; of middle ones as 21:14:11:7:6; those of posterior pair as 15:23:13:10:8. Last section of fifth vein 34, cross-vein 10 fiftieths of a millimeter long.

Described from thirteen males and fifteen females, taken at Smith's Cove, Nova Scotia, August 6, 1925, by A. Gibson.

Holotype, ♂, *Allotype*, ♀, No. 1958, in the Canadian National Collection, Ottawa.

This is, I think, the only species of the genus so far taken in the eastern part of the continent.

***Gymnopternus annulatus* n. sp.**

Male. Length 2.2:2.5 mm. Face white, wide. Palpi and proboscis black. Front green, dulled with yellowish brown pollen. First two antennal joints reddish brown; third joint brown, a little longer than wide, rounded at tip; antennae and arista with short pubescence. Orbital cilia wholly black.

Thorax and abdomen dark green, dorsum of former with brown, pleura and abdomen with white pollen; hairs on the abdomen black. Hypopygium black, dulled with white pollen; the lamellae rather wide at the middle, black, somewhat crescent-shaped, a little reddish at base, fringed with black hairs.

Coxae yellow with black hairs and bristles, middle and hind pairs blackened on basal half of outer surface. Femora and tibiae yellow; posterior femora with a black preapical ring, their extreme tips yellow; the row of bristles on anterior tibiae rather small with three longer ones in the row. Tarsi yellow, a little darker towards their tips, extreme tip of the first joint of posterior tarsi brown. Joints of fore tarsi as 22:8:7:6:7; of middle pair as 28:16:11:8:8; and of posterior pair as 17:25:15:8:8. Calypters and halteres yellow, the former with black cilia.

Wings tinged with brownish gray; third and fourth veins parallel; last section of fifth vein 26, cross-vein 16 fiftieths of a millimeter long.

Described from two males. The type was taken at Smith's Cove, Nova Scotia, August 6, 1925, by A. Gibson; the paratype at Wallops Island, Virginia, June 1, 1913, by W. L. McAtee.

Holotype, ♂, No. 1955, in the Canadian National Collection, Ottawa.

***Gymnopternus lividifrons* n. sp.**

Male. Length 2.5:2.7 mm. Face rather narrow, a little wider above, silvery white. Palpi black. Proboscis yellowish brown to black. Front dark blue, somewhat shining, with only a very little pollen. Antennae black, sometimes the first joint reddish below; third joint about as long as wide, obtusely pointed at tip. Orbital cilia wholly black.

Dorsum of thorax and abdomen dark shining green, the latter with black hairs; pleura black, dulled with white pollen. Hypopygium black, its lamellae narrow, somewhat crescent-shaped, yellow with a narrow black border and black hairs; inner appendages yellow with two hairs.

Fore coxae yellow, scarcely darkened at base, with small black hair and black bristles at tip; middle and hind coxae black with yellow tips. Femora and tibiae yellow, posterior tibiae very slightly darkened at extreme tip. Fore tarsi yellow, only a little darkened at tip; middle and hind tarsi black from the

tip of the first joint, second joint of posterior pair usually yellow at root. Joints of fore tarsi as 23:9:6:6:6; of middle ones as 31:18:13:9:8; joints of posterior pair as 22:29:19:14:8. Calypters and halteres yellow, cilia of the former partly pale and partly black.

Wings tinged with grayish brown; third and fourth veins parallel; last section of fifth vein 33, cross-vein 16 fiftieths of a millimeter long.

The female has the face wide and the cilia of the calypters wholly black.

Described from fourteen males and five females. Mr. C. H. Curran took one at Orillia, Ontario, June 7, 1925, and two at Hull, Quebec, June 10 and 15; all the rest were taken by G. S. Walley, at Point Pelee, Ontario, May 28.

Holotype, ♂, *Allotype*, ♀, Point Pelee, Ont., No. 1954, in Canadian National Collection, Ottawa.

CAPSUS SIMULANS (STAL) AND LABOPS BURMEISTERI STAL,
RECOGNIZED FROM THE NEARCTIC REGION (HEMIPTERA,
MIRIDAE).*

BY HARRY H. KNIGHT,

Ames, Iowa.

Capsus simulans (Stal).

1858 *Deraeocoris simulans* Stal, Stett. Ent. Zeit., xix, p. 186.

1879 *Capsus simulans* Reuter, Ofv. Fin. Vet. Soc. Forh., xxi, p. 56.

1896 *Capsus simulans* Reuter, Hem. Gymn. Eur., V, pp. 16, 357.

This species was described from Irkutsk and Kamtshatka by Stal (1858) and later recorded from Amurland by Reuter (1879). *Simulans* has been known only from Oriental Siberia, still its distribution has long suggested that its range might extend across into Alaska to the Nearctic region. For some time past I have puzzled over certain western specimens of *Capsus* which in most respects look like *ater* Linn. yet the distinctly more slender antennae seemed to place the species in *Irbisia*. After working carefully over the literature of known species of *Capsus* I can only arrive at the conclusion that these western specimens belong to *Capsus simulans* (Stal). Records of specimens examined are as follows:

ALASKA: July 1, 1899, Kukak Bay (T. Kincaid), Harriman Expedition (U.S.N.M.). ALBERTA: Banff, Aug. 1, 1920, (C. E. Hendrickson). Lethbridge, June 23, 1923 (H. E. Gray). MONTANA: Bozeman, June 18, 1912, June 29, 1900, alt. 4800 ft. (Cooley). WYOMING: Yellowstone National Park, July 20-25, 1920 (A. A. Nichol). SOUTH DAKOTA: Brookings, June 12, 1923; Lead, July 12, 1923; Newell, June 29, 1923 (H. C. Severin). MINNESOTA: Norman Co., June 16, 1920 (A. A. Nichol). St. Paul, June 16, 1924 (H. H. Knight). IOWA: Ames, May and June, 1925 (H. H. Knight).

Capsus simulans var. fulvipes new variety.

Differs from the typical form in having uniformly yellowish to fulvous colored legs. This form is comparable to *Capsus ater* var. *tyrannus* (Fab.) with its fulvous legs. Some specimens have the vertex and disk of pronotum becoming yellow but the calli and margins of disk always remain dark. I have seen no color form of *simulans* that would be comparable to *ater* var. *semiflavus*

*—Contribution from the Department of Zoology and Entomology, Iowa State College, Ames, Iowa.

(Linn.), a variety having the pronotum entirely fulvous.

♂. Length 5.8 mm., width 2.6 mm. Head: width 1.38 mm., vertex .76 mm. Antennae: segment I, length .58 mm., thickness .116 mm.; II, 1.57 mm., slender at base and gradually becoming thicker toward apex, thickness .128 on the apical one-fourth, or only slightly thicker than segment I; III, .66 mm.; IV, .83 mm.; black, segment II brownish on middle, segment I brownish black. Pronotum: length 1.10 mm., width at base 1.97 mm.

Type: ♂ June 12, 1923, Brookings, South Dakota (H. C. Severin); author's collection.

Paratypes: ♂, taken with the type. ♀ June 1, 1921, Capa, South Dakota (H. C. Severin). ♂♂ ♀♀ May 18, 1925, Ames, Iowa (H. H. Knight); a good series taken on Brome grass (*Bromus inermis* Leyss.).

The color characteristics of this variety come nearest to *Capsus intermedius* Reut., and aside from that author's opinion of the species I can only recognize certain small details of difference found in the original description.

Both *Capsus ater* (Linn.) and *Capsus simulans* (Stal) occur at Ames, Iowa, but I have found the latter species most numerous. *Capsus ater* shows a preference for blue grass (*Poa* spp.) while *Capsus simulans* was found only on Brome grass (*Bromus inermis* Leyss.) The botany manuals give the native distribution of this particular species of Brome grass as "European region, Caucasus, and boreal Asia." In North America it has been introduced as a forage grass throughout the great plains region, from Nebraska and Colorado to Montana. In Iowa this grass is found spreading along the railroad tracks and occurs at Ames chiefly along the Chicago Northwestern line. This naturally raises the question of whether or not the bug is native on other species of Brome grass or has it been imported along with the Asiatic and European grass?

Labops burmeisteri Stal.

Among some Miridae sent for determination by Dr. McDunnough are two male species of *Labops burmeisteri* Stal, bearing the label "Abitibi Region, June 24-26, 1915, Dr. Cook." On further inquiry Dr. McDunnough states: "this region is in northern Ontario between the town of Cochrane on the Canadian National railroad and James Bay, the Abitibi river being a tributary of the Moose river which flows into the southern end of James Bay." *Burmeisteri* is listed in Van Duzee's Catalogue (1917) with the localities "Ont., N.Y., Alaska." but I have been unable to trace any specimens on which the records are based. The Ontario record was published by Gibson (Rept. Ent. Soc. Ont. for 1910, p. 125) the specimens from Sudbury, Ontario (James Evans), determined by Van Duzee. Dr. McDunnough states that he is unable to find such specimens in the Canadian National collection. As for the New York record I would be glad to be shown specimens if anyone believes they have the species. There is at hand for comparison and study, a specimen of *burmeisteri* determined by Reuter (♀, Shigansk, Lena infer. Russia, B. Poppius), which comes from a region near the type locality of the species.

In my key to the species of *Labops* (Can. Ent., liv, 1922, p. 258), *burmeisteri* Stal runs to *tumidifrons* Knegt. from which it can be readily separated by the larger size, nearly flat and less prominent tylus, and the largely yellow tibiae.

THE NYMPH OF EPHEMERA GUTTULATA PICTET WITH NOTES
ON THE SPECIES.

BY CLARENCE HAMILTON KENNEDY,

Ohio State University, Columbus, Ohio.

While on a trip into the mountains of Eastern Tennessee during May, 1923, the writer had the fortune to observe the very interesting Mayfly, *Ephemera guttulata*, and to collect its nymphal skin which appears to be undescribed. This was taken on a small mountain stream on the west slope of Chilhowee Mountain just back of Montvale Springs Hotel.

This striking mayfly with its almost black wings and thorax, set off by the snow white abdomen, lives in the smaller perennial, spring-fed torrents that flow down the higher of the Eastern Tennessee mountains. On Chilhowee Mountain these streams pour down deep V-shaped gorges over beds of small stones and coarse grit, in a succession of miniature water falls, for they descend at the rate of several hundred feet to the mile. These mountains are covered with pines on their high dry ridges but the deep ravines between these ribs of pine woods are filled with a dense growth of deciduous timber so that these torrents are heavily shaded by tall trees in their whole course.

The species of *Ephemera* are usually found in large rivers or open lakes where an extensive surface is open to the light sky. These eastern Tennessee streams were completely shaded so that the reaction of this species to light were quite different from the reactions of the common *Ephemera simulans* of Lake Erie. In *simulans* the nymph burrows in the mud of the lake bottom, being obviously negatively phototropic. At the time of emergence it becomes positively phototropic and rises to the light of the sky. At Put-in-Bay this emergence takes place between 8 and 10 p.m. It sheds its skin as it rises through the water and bursts out at the surface fully winged, when it becomes less positively phototropic and flies towards the dark land. It rests on the shore vegetation until the following evening when it sheds its subimago skin, becomes sexually mature and at twilight flutters up and down in a mating dance. At this stage it is evidently becoming positively phototropic again. In this twilight dance it leaves the dark foliage for the more open lighter spaces. The males grasp the females and release them after a few seconds. The female becomes at once completely, positively phototropic and flies out toward the light surface of the lake to deposit her eggs.

If we compare this series of reactions with those of *guttulata* of the shaded mountain streams, we find that two of the series of reactions of *guttulata* are reversed. *Guttulata* is negatively phototropic as a nymph, is positive as it emerges, but *remains positively phototropic after emergence* as it flies from the heavily shaded creek to the lighter areas above the shade. Further, *after copulation it becomes negatively phototropic* and flies down to the densely shaded torrent to oviposit. *Simulans* or any of the other open stream species of *Ephemera* would react themselves away from a shaded stream when they started to oviposit. So by these reversed reactions *guttulata* is able to occupy a habitat that normal members of the genus *Ephemera* are not able to occupy, one that is ecologically outside the general habitat of the genus.

The bizarre coloration of black thorax and wings with snow white ab-

domen is also interesting in its relation to the habitat. Except for the white abdomen, the mayflies, at the time of the twilight flights were practically invisible to the observer. These white abdomens, as the *guttulata* females dodged about in the gathering darkness reminded one of the streaks of light of a flight of fireflies. It is possible that this white abdomen is useful to *guttulata* in the mating flights in the deep shade of the mountain gorges as its visibility is very obviously increased by this pattern. A snuffcolored, lowland Ephemera would be practically invisible under the same conditions. The reactions of this species have been discussed more fully elsewhere (Biol. Bull, 48, pp. 390-401, 1925).

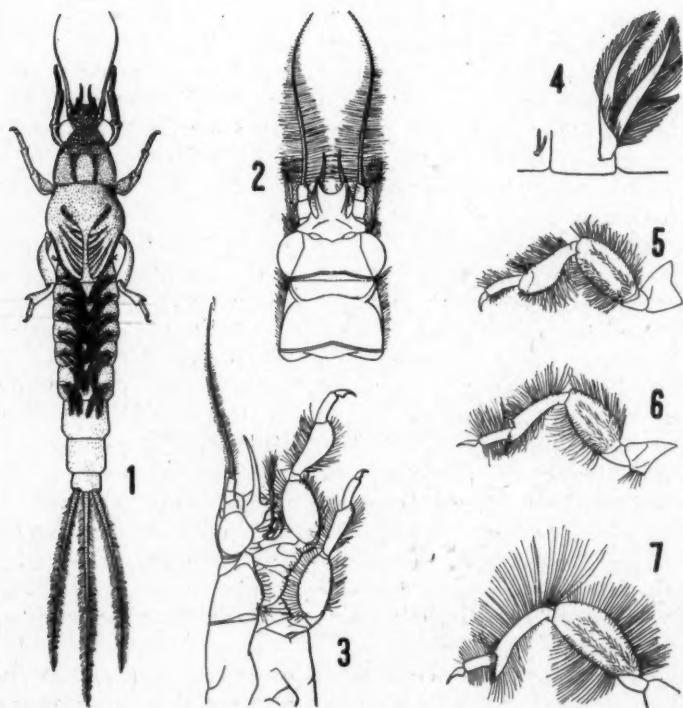


Fig. 1. Dorsal view. Fig. 2. Head and pronotum. Fig. 3. Lateral view of head and prothorax. Fig. 4. First and second gills. Fig. 5. Fore leg. Fig. 6. Middle leg. Fig. 7. Hind leg.

The burrowing larva of *guttulata* lives in the meager areas of coarse sand and muck found in the little basins below the water falls. The sub-imagoes the writer observed to emerge came out on dull cloudy days. These fly out of the shade over the stream up to the better lighted areas of the hillside where they rest in the full light. No mating dances were seen. These probably took place among the tree tops just before the egg-laying began at twilight.

The following description of the nymph parallels that of Needham for *Ephemera varia* (Bull. U. S. Bureau of Fisheries 36, p. 285, 1920.). See figures 1-7.

Length, full grown (exuvia) 20 mm.; tails 11 mm. additional; antennae 5 mm.

Color dark brown, lighter on abdomen which in the exuvia shows no marked color pattern. Head, thorax and wing pads dark brown with two parallel dark stripes on the dorsum of the prothorax. The wing pads with alternate light and dark lines radiating along the main veins fanwise.

Antennae slender, three times the length of the mandibular tusks. Basal half with widely spreading horizontal hairs, the outer half more nearly naked. The frontal prominence ends in a sharp tooth at either side, the two separated by a regularly rounded notch in front. (In *varia* the bottom of this notch is squared off). Mandibular tusks long, slender, upcurved. Viewed from above they project the length of the frontal prominence in front of that organ. (In *varia* half again as far.). From above their outer curve is visible between the antenna and the frontal prominence. (In *varia* it is visible outside the antenna). Maxillary palp very slender reaching to beyond the middle of the mandibular tusk.

All legs short and twisted, clothed with long hairs on their edges. Femora of each broadly oval. Tibia of fore leg spatulate with no apical tooth, of middle and hind leg cylindrical slightly curved and terminating in a large digging tooth. Tarsus a single segment more than half as long as the tibia with a single movable claw.

Gills yellowish, those on segment 1 bifurcated rudiments; on segments 2-7, large, bushy, the two divisions of equal size. Tails thinly margined with horizontal hairs. Middle tail longer and slenderer than the outer ones.

The figures are from an exuvium of *Ephemera guttulata* Pict. from Chilhowee Mountain, Blount County, Tennessee, now in Collection Kennedy.

RECORDS OF HEMIPTERA FROM BRITISH COLUMBIA.

BY OSCAR WHITTAKER,

Chilliwack, B. C.

There are a few slight inaccuracies in Mr. J. R. de la Torre-Bueno's article (Can. Ent. LVII., p. 280).

Chlorochroa uhleri, Stal. This, one of our commonest Pentatomids, was recorded from Vancouver Island in this magazine for 1920 (Vol. LII., p. 12).

Neottiglossa sulcifrons, Stal. and *Acanthia interstitialis*, Say were both recorded from this province in The Proceedings of the Entomological Society of British Columbia for 1921.

Two species of the subgenus *Gerris*, namely *marginatus* Say and *buenoi*, Kirkaldy were also recorded in the same publication.

NEW CANADIAN CHIRONOMIDAE.*

BY G. S. WALLEY,

Ottawa, Ont.

Tanypus apicalis n. sp.

Length 4.5 mm. *Female*. Resembles *T. carneus* L. except for banding of legs. Head and antennae yellowish. Thorax with three broad longitudinal stripes of buff on the dorsal area which tend to become fuscous anteriorly. Scutellum and area in front shining white. Pleura white with black vitta. Legs yellowish, banded as follows: all femora, tibiae and basitarsi with apical black bands; second tarsal joint pale throughout; the remainder of tarsi black. Wings with two main fuscous bands, one covering the crossveins and the other a broad preapical band. Abdominal segments yellowish with fuscous bands on segments 3, 4, 6 and 7.

Holotype—♀, Aylmer, Que., July 13, 1924, (Curran); No. 1748 in the Canadian National Collection, Ottawa.

Paratypes—1 ♀, Aylmer, Que., Aug. 4, 1924, (Curran); 1 ♀, Norway Point, Lake of Bays, Ont., Aug. 1, 1919, (J. H. McDunnough).

Tanypus peleensis n. sp.

Length, 5 mm. *Male*. Head and palpi brownish. Basal segment of antennae, black with greyish pollen. Antennal plume yellowish white. Pronotum pale, often almost white. Pleura brownish with white vittae. Dorsal region of thorax brownish usually heavily coated with light grey pollen. Scutellum yellowish to fuscous. Halteres white. Tibiae white with three black bands of equal width situated as follows: one apical one sub-basal and one between and equidistant from the two former. Wings with dark spots as follows: crossveins distinctly darkened; one large preapical spot; one smaller spot below and toward wing base, three fainter apical spots at the margin; a slightly darker spot in the anal region. Abdomen with tergites 1, 2, 3, and basal part of 4 usually white, often with a trace of fuscous; remaining tergites usually uniformly fuscous. Abdominal hairs white.

Female. Similar to male, with darker and more distinct wing spots. Described from 74 specimens taken at Point Pelee, Ontario, 1925, (G. S. Walley).

Holotype—♂, Pt. Pelee, Ont., June 10, 1925; No. 1749 in the Canadian National Collection, Ottawa.

Allotype—♀, same data as ♂.

This species resembles *T. basalis* Walley and *T. illinoensis* Mall. but differs from the former in the position of the spots on the wing and from the latter both in wing markings and the relative widths and positions of the front tibial bands.

Chironomus imperator n. sp.

Length 10-11 mm. *Male*. Head above and behind eyes yellowish. Palpi well developed and dark brown. Frontal tubercles well developed, yellow. Basal segment of antenna dull black, flagellum dark brown with fuscous plume. Thorax dark brown to almost black. Pronotum yellowish with fuscous markings and

*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

with median dorsal margin obtusely notched. Dorsum uniformly fuscous with sparse pollen and with a yellowish brown area in the anterior lateral region. Pleura yellowish with fuscous vittae. Mesopleura rather prominent and distinctly darkened. Scutellum and postnotum blackish. Legs fuscous. Anterior coxae yellowish, their femora also pale, gradually darkening to fuscous at apex, remainder of fore leg uniformly fuscous to black. Fore tarsi with long cilia posteriorly. Mid and hind legs fuscous darkening towards apices and with knees also darkened. Pulvilli yellowish. Wings hyaline, first two veins and cross-vein darkened. Abdomen fuscous to blackish with apical tergites tending to become yellowish at apices. Hypopygium prominent with the median process well developed and glossy black. Abdominal hairs fuscous.

Female. Similar to male. Dorsum of thorax in front of scutellum rather thickly coated with grey pollen.

Described from 16 ♂ and 14 ♀, Pt. Pelee, Ont., 1925, (G. S. Walley).

Holotype—♂, Pt. Pelee, Ont., June 17, 1925; No. 1750, in the Canadian National Collection, Ottawa.

Allotype—♀, same data as holotype.

AMELOCTONUS FUGITIVUS SAY (HYMENOPTERA,
ICHNEUMONIDAE).*

BY H. L. VIERECK,
Ottawa, Ont.

In reply to Cushman's rejoinder, Proc. Ent. Soc. Wash., Vol. 27, pp. 164-166, to my synonymy, proposed in "The Canadian Entomologist," Vol. 57, p. 104, 1925, I have to say that there is a male *Campoplegine*, tag-mounted on a pin with the label "Dundurn, Sask., May 16, 1923 (K. M. King)," in the Canadian National Collection, that agrees with Say's description of *fugitivus*, even in the color of the hind tibiae, consequently I deem it unreasonable to assume that Say "almost certainly.....overlooked the fact that the extreme base of the tibiae in his specimens was white," especially since in the same description Say asserts that the hind tarsi have the base of the first joint white, indicating that when Say found a member to be white at the base he recorded the fact.

Indications are, as I have hinted before, that most, if not all of Foerster's segregates of *Campoplex* Gravenhorst, as restricted by Westwood, are synonymous or at the most only subgenera of that genus.

As to Cushman's ideas on *Limneria pilosula* Provancher and *Amorphota perrivalis* Viereck. I have recently examined the types of those species and I am satisfied that the former is an *Angitia* and that the latter is an *Ameloctonus*. Such being the case *Hyposoter pilosulus* Cushman, not Provancher, will have to be called *Hyposoter ephestriae* Ashmead.

If the Foerster collection of *Campoplegoidae* is still extant, it is to be hoped that someone will check up his classification with his specimens and describe his genera more fully. I trust that one or more of our European colleagues who are interested in Ichneumonidae will take upon themselves the task of at least locating Foerster's collections.

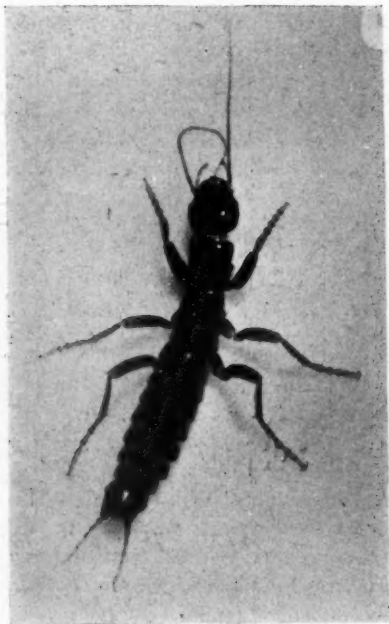
*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa, Ont.

ON THE BEHAVIOR OF GRYLLOBLATTA.

BY NORMA FORD,

University of Toronto.

During 1924 and 1925 the writer observed for 10 months the behavior of *Grylloblatta campodeiformis* E. Walk., a primitive Orthopteran insect, and what was seen was unusually interesting. This insect, living normally at about zero centigrade, was discovered by Dr. E. M. Walker on Sulphur Mountain at Banff, Alberta, in the summer of 1913. Earlier attempts to keep the insect alive in the laboratory were not successful, but this has now been accomplished by keeping the jars continually packed in ice, in partial darkness, and with each insect living in a separate jar. The jars which served as vivaria had perforated screw-tops and were partially filled with damp moss. In earlier attempts where these precautions were not taken the insects died within two weeks.



Grylloblatta campodeiformis Walk.
Adult male, cleaning antenna (x2.5)

The remarkable structure and relationships of this insect have been discussed in several papers.* The generic name *Grylloblatta* indicates its relationship to both the saltatorial Orthoptera, as typified by the cricket, *Gryllus*, and to the

*—Walker, E. M., 1914. Can. Ent., vol. 46, pp. 93-99; 1919. Can. Ent., vol. 51, pp. 131-139; 1919. Ann. Ent. Soc. Am., vol. 12, pp. 267-316; 1922. Ann. Ent. Soc. Am., vol. 15, pp. 1-76. Crampton, G. C., 1915, Ent. News, vol. 26, pp. 337-350; 1917. Can. Ent., vol. 49, pp. 213-217; 1917. Journ. N. Y. Ent. Soc., vol. 25, pp. 225-237.

cursorial Orthoptera, by the roach, *Blatta*; while the specific name, *campodeiformis*, draws attention to the simple body form similar to *Campodea*.

We have made some preliminary studies on the internal anatomy of *Grylloblatta* and surprisingly primitive organs have been found. The work, however, was much hampered by lack of material since we had for dissection only two adult female specimens and one nymph, the latter having been cut in serial sections. Therefore at the close of the British Association Meetings in August 1924 I travelled with the Zoological section across the continent and spent three weeks in the Rockies searching for additional specimens. As soon as we reached the mountains and stopped for a few hours at Jasper Park, we commenced the search hoping that some good fortune might favor us even in this short time. But there were no captures to report and the real search started on September the third at Banff.

Dr. Walker's specimens had been collected on Sulphur Mountain at Banff and during the summer of 1924 Mr. E. Hearle made captures on Rundle Mountain. In both these places I searched carefully, turned over hundreds of stones but the expeditions were quite unsuccessful as regards *Grylloblatta*.

Then a several days' trip was made to Lake Louise. On arrival I climbed the well-known tourists' trail to Lake Agnes, a little glacial lake in the mountains two thousand feet above Lake Louise. The lake lies in an amphitheatre hidden by an unusual formation of rock, well named the Beehive. The high walls of the amphitheatre on the left side cut off the sunshine and here particularly the soil is cold and barren, while the right side of the amphitheatre is also steep and covered with many loose stones. I spent a long afternoon working my way around the right side, turning over the stones on this dry slope. At dusk when the last tourists were disappearing down the trail, I hurried to the centre of the amphitheatre where a bog is formed by the ice water trickling from the glacier to the lake. False Hellebore, a poisonous plant, was common here, and there was an abundance of Grass of Parnassus among the moss. On turning over a flat stone there were three adult *Grylloblattae*, two males and a female. Between their excitement and mine it was difficult to get them into boxes. The next stone covered a fourth, but a number of other stones gave no further results. So I hurried down the trail in the dark.

The next morning I expected to take at least forty specimens and literally no stones was left unturned in the swampy ground as I worked in ever enlarging circles from the point of the first capture. But not a specimen was found. In the middle of the afternoon one adult and two nymphs were taken and that ended all captures.

Two adults which were shipped to Toronto died, but the other five were kept packed in ice and four thrived for many months in captivity. The fifth, a small nymph, was accidentally drowned.

It is evident from watching these insects in captivity that they are nocturnal and probably lie hidden in the moss during the day and prowl around at night. In their cages they are found to be most active at night and when tested with a strong flashlight for light reactions the insects sometimes turn first towards the light but then always walk slowly away into the shadows of the moss.

Heat reactions are most marked and the optimum seems to be at a few degrees above zero centigrade. If placed in a large vessel containing pieces of ice the insects keep close to the ice, on it or under it, and as the ice melts, forming miniature streams, the *Grylloblattae* readily wade them. In one instance the tin pail holding the cages and crushed ice sprang a leak so that the water trickled away as fast as the ice melted and the cages were not kept sufficiently cooled. Each insect was then found stretched out flat on the bottom of his jar, keeping close to the only portion of the glass that was cooled by the escaping ice water.

Several tests were made to determine the effect upon *Grylloblatta* of temperatures lower than zero. A specimen was left for half an hour at a temperature of -2.5° C. but suffered no ill effects, and his somewhat greater activity we interpreted as a slight disturbance caused by the cold, basing this theory upon comparisons made with roaches at temperatures lower than their normal. The insect was then exposed to a temperature of -4° C. for 20 minutes and showed no marked reactions, then -6° C. and finally to -9° C. Unfortunately in the last case the method was varied so that the insect was cooled very rapidly in a thin test-tube which was plunged into the cold brine solution. In one minute and a half he was numbed and more than that, his feet and antennae were frozen. The subsequent sufferings were very acute but he lived on for over six months. The experiment was conducted on December the twelfth. A week later the feet were growing stronger and after a month he was quite active, but for some time when resting he dropped his body on the ground and did not hold it high supported by the legs in the manner of the uninjured individuals. The antennae were at first useless and were held back over the body or stretched out at the sides, while with the palpi the insect felt his way slowly along. On January the twentieth, six or seven of the distal segments of the antennae had been shed leaving but fourteen joints.

In their food habits *Grylloblattae* are omnivorous. They were fed at first after their capture on the pupae and larvae of ants, later in the fall house-flies were accepted, and during the winter diet consisted of cockroaches. Often the *Grylloblattae* were observed nibbling the moss in their cages and they were particularly fond of the bark, so that pieces of the moss would be found stripped clean of the outer layers. As a variation in diet we offered the insects small bits of raw beef and liver but they were not touched. In the fall and early winter they ate greedily, but by spring the food was scarcely noticed.

Unless *Grylloblatta* is very hungry it will not attack a living insect. Generally we pampered our guests by killing and cutting open their insect-food, since *Grylloblatta*, if it has to manage alone, has some difficulty in cutting through the chitin. When left to itself *Grylloblatta* is alarmed by the movements of the strange insect and not until the cold has numbed the victim does it strike, then generally between the head and thorax. The food is held down with the first foot and if disturbed it savagely picks up its prey and carries it off.

One would wonder what animal food *Grylloblatta* finds on the mountains. Mr. A. N. Caudell has suggested to us that ample food would be supplied by the insects which during the sunshine of the day fly to the colder parts of the mountains or are carried there by the winds, only to be rendered inactive or killed by

the low temperatures at night. Later, as a result of the dark pigments in their bodies, the sun's rays melt the ice and snow beneath them and they drop gradually into little pits and should then serve as a store-house of food for *Grylloblatta*.

Normally *Grylloblatta* is very quiet, resting in one spot for hours and when the cage is gently tapped the insect turns its head, the female slowly waving her antennae, the male jerkily lifting one or two legs. The behavior, one must admit, reminds one of an insect in a stupid state. Yet when *Grylloblatta* is teased sufficiently it takes the defensive, attacking with wide-spread mandibles and often with abdomen held high above the head.

The insects are frequently found cleaning their bodies and when so engaged twist themselves into many strange positions, such as lying on the back, legs spread in all directions for balance, with the head bent sharply forward to clean the ventral side of the thorax and the bases of the legs. The head is cleaned by firm, rapid strokes, such as a cat uses in washing its face.

From the time of capture many attempts were made to mate the insects by putting them in the same cage for a time. But they came no nearer to each other than the distance for playing the tips of their antennae. If one attempted to approach, the other answered with a snap and perhaps a slap of the fore-foot. Often when the couple came face to face each would commence to nibble its foot, clean its antenna, or polish its head. It is of interest that Fabre described similar behavior in his essays on the habits of the white-faced *Decticus* and in both instances the insects soon separated with nothing further, each went his way, and for the time being nothing more happened. In the case of *Grylloblatta*, if the parting were not peaceful because one had attempted to advance, each would hurry off so nervously and excitedly that it would bite viciously at pieces of moss encountered in its haste, or seize half a cercus or the tip of an antenna of its mate in passing, or give a nip to a leg.

On November the eighth it was noticed that the black eggs were clearly showing through the bodies of the females. Finally on January the twenty-fifth when the male and female were put together, they played their antennae a moment, then suddenly there was a rough and tumble fight and the male fell at the bottom of the cage. Slowly he came up the moss again, this time in a flash winding himself around the body of the female and catching the edges of her prothorax with his wide-spread mandibles. This hold he retained during a half-hour's struggling and tumbling until finally by a "ju-jitsu" method he made her powerless by slipping his first legs under her first and second ones and his second pair under her third. Copulation lasted twelve hours. A month later the eggs within the body of the female had enlarged considerably but were carried for six months before being laid in July. The male refused to mate again, excepting on one occasion, on May the twenty-sixth, when after a rough fight he caught hold of the side of the abdomen of the female, but fearing that he might make a wound we separated them.

A second female, which had not mated in captivity, carried twenty or thirty black eggs and early in March deposited five of them, but died during oviposition. It was a point of interest to determine how the ovipositor would be

used, whether slits would be cut in the stems of the moss, or the eggs slipped between the bases of the leaves or deposited in the soil. The insect was first observed stiffened and immobile with the ovipositor thrust in the moss, but in a few moments she drew it out and hurried about carrying the egg at the tip of the blades until it was dislodged by the moss. Some hours later when another egg was passing the insect curled herself into a ball and massaged the left side of the abdomen with her jaws, commencing near the thorax and working towards the tip, repeating the process five or six times until the egg had passed into the blades, then she indifferently dropped it. On a third occasion the blades were thrust into the soil, but finally the egg was dropped. The method described was probably abnormal, for it seemed as if the eggs were too sticky, since they adhered to the tip of the blades and the last egg in passing became firmly glued in the base of the ovipositor. A few hours later the insect died.

The female which had been mated in captivity deposited in July thirty or forty eggs in the soil moss and the process of oviposition was definitely watched. The ovipositor while held at right angles to the body was thrust into the soil and the egg each time passed quickly in the course of a few minutes. Early in August this individual died and since she was still carrying forty or more black-shelled eggs and many immature ones, the death was probably premature.

The male lived for nine and a half months but during the last weeks was very feeble. The mesothorax would periodically turn white and the stomach would become greatly inflated after feeding.

The nymph was accidentally killed on July the twenty-fifth. In the ten months of captivity, although it had fed regularly and seemed healthy and active, it had not grown perceptibly, still remaining between 7 and 8 mm. in length. Either growth is remarkably slow or the conditions of its environment were unsuitable.

Environmental factors were kept fairly constant, as our major interest was a study of respiratory exchange, an account of which will be published in a separate report. With only four individuals at our disposal our first consideration was to keep these insects alive for as long a period as possible without unduly varying the conditions under which it was found that they could exist in captivity.

Since the above was written, a second trip was made to the Canadian Rockies in September 1925, when seventy specimens of *Grylloblatta* were taken and fifty-two of these have been kept alive. At the present time we are, therefore, adding considerably to the observations of behavior and have in mind for future experiments a study of the effects of external factors. Morphological investigations are also in progress and these together with the physiological studies we plan to embody in a much fuller report.

A PRELIMINARY REVISION OF THE CAMPOPLEGINAE IN THE
CANADIAN NATIONAL COLLECTION, OTTAWA.

BY HENRY L. VIERECK,

Ottawa, Ont.

(Continued from page 38).

Sagaritis incompletus n. sp.Related to *S. nephelodis* Ashmead.

Male. Length 7 mm.; black, head nearly cubical, scape reddish, blackish near apex above, pedicel blackish, dark stramineous beneath, mandibles mostly yellowish, palpi yellowish stramineous, tegulae yellowish with a pale stramineous margin, fore and mid legs including the coxae stramineous, excepting their trochanters which are yellowish, and the end joint of their tarsi which is more or less brownish, hind legs including coxae more or less reddish stramineous, their distal trochanters somewhat yellowish, their tibiae somewhat brownish near base and at apex, their tarsi blackish brown with the first joint yellowish at base, postpetiole laterally reddish, basal half of second tergite mostly blackish, the apical half mostly reddish, third and fourth tergites reddish, fifth and sixth tergites reddish, along the lateral margin; areola truncate at base, poorly separated from the petiolarea, at least one and one half times as long as its greatest width, finely reticulated, petiolarea rugulose.

Holotype—♂, Ottawa, Ont., (W. H. Harrington); No. 1632 in the Canadian National Collection, Ottawa.

In many ways this species seems to bridge the gap between typical *Sagaritis* and *Pyracmonoides*.

Sagaritis nigrisignatus n. sp.Related to *S. nephelodis* Ashmead.

Female. Length 7 mm.; compared with the original description of *S. incompletus* Vier. This differs as follows.—Head transverse, the stramineous portions of fore and mid legs reddish, postpetiole mostly reddish, with a basal, median, longitudinal, shallow furrow and an impression on each side of that, third tergite with a black band at base, middle third of apical half of fifth tergite mostly black, the remaining tergites black above, partly reddish on their sides, plica yellowish; petiolarea transversely costate.

Male. Characters essentially as in the female; fourth and fifth tergites reddish, blackish at base.

Holotype—♀, Aweme, Man., July 8, 1914, (N. Criddle, No. 8101, ex Crambid on wheat and grass); No. 1633 in the Canadian National Collection, Ottawa.

Allotype—♂, with the same data as the holotype.

Paratypes—with the same data as the holotype but July 4 and Point Pelee, Ont., June 29, 1920, (N. K. Bigelow).

Sagaritis melanosomus n. sp.Related to *S. nigrisignatus* Viereck.

Female. Length 5 mm. antennae black, pedicel brownish at apex, mandibles dark stramineous, palpi dark stramineous, tegulae yellow with a pale stramineous margin, coxae and hind proximal trochanters black, rest of legs mostly stramineous.

eous, end joint of fore and mid tarsi blackish, hind tarsi mostly brownish, their tibiae and femora somewhat reddish, abdomen black, plica yellowish and infuscated; areola and petiolarea confluent, the former finely sculptured, truncate at base, the latter transversely rugulose; sheaths of the ovipositor nearly as long as the first tergite.

Holotype—♀, Beaver Lake, Alta., July, 1907, (A. Halkett); No. 1635 in the Canadian National Collection, Ottawa.

***Sagaritis signatus* n. sp.**

Related to *S. melanosomus* Viereck.

Female. Length 6 mm.; black, antennae black or blackish throughout, mandibles mostly yellow, palpi stramineous, tegulae yellow with a stramineous margin, coxae black, fore and mid proximal trochanters stramineous, hind distal trochanters black with an apical yellowish margin, all distal trochanters yellowish, rest of fore and mid legs reddish stramineous excepting, fore tibiae with the extensor surface yellowish, mid tibiae with the extensor surface yellowish save for a brownish annulus near the base and the apical half which is mostly brownish stramineous, hind femora reddish, their tibiae with the flexor surface mostly reddish, the extensor surface with the basal and apical third blackish, the intermediate third yellowish, hind tarsi blackish, the first joint yellowish at base, abdomen black, the first tergite reddish at apex, the second reddish down the middle and on most of its apical third, third tergite reddish, blackish at base, fourth tergite reddish, fifth tergite reddish except above, lower half of sides of sixth tergite reddish, plica mostly yellowish; sheaths of the ovipositor apparently as long as the second tergite; areola nearly confluent with the petiolarea not much wider at apex than at its truncate base, finely reticulate, petiolarea rugulose.

Holotype—♀, Oliver, B. C., June 3, 1923, (C. B. Garrett); No. 1639 in the Canadian National Collection, Ottawa.

***Sagaritis twinni* n. sp.**

Related to *S. signatus* Viereck.

Female. Length 5 mm.; compared with the original description of *S. signatus* Vier. this differs as follows.—Fore and mid coxae brownish, fore and mid proximal trochanters yellowish, hind tibiae stramineous at base, first tergite stramineous at apex, a little more than the apical sixth of the second tergite with a yellowish brown band, the succeeding tergites with an apical stramineous band, sides of the third and following tergites mostly reddish; sheaths of the ovipositor nearly twice as long as the apical truncature of the abdomen; areolet complete, truncate at base, nearly twice as long as wide at apex, finely reticulate, petiolarea finely transversely costate.

Male. Characters essentially the same as in the female.

Holotype—♀, Ottawa, Ont., July 21, 1924, (C. R. Twinn); No. 1646 in the Canadian National Collection, Ottawa.

Allotype—♂, Royal Oak, B. C., July 24, 1917, (W. Downes).

Paratype—♀, with the same data as the holotype.

***Sagaritis trackas* n. sp.**

Related to *S. twinni* Viereck.

Male. Length 5 mm.; compared with the original description of *S. signatus* Vier. this differs as follows.—Fore and mid coxae mostly brownish stramineous, partly black, fore and mid proximal trochanters yellowish, fore and mid tibiae with their extensor surface paler than their flexor surface, the mid tibiae yellowish at base, not appreciably banded, hind tibiae yellowish at base, first tergite reddish and stramineous at apex, the remaining tergites colored nearly as in *S. twinii* Vier. the pale parts mostly reddish; areola and petiolarea confluent, the former narrowly truncate at base, mostly coarsely rugose like the petiolarea.

Holotype—♂, Agassiz, B. C., Aug. 1, 1921, (R. Glendenning); No. 1641 in the Canadian National Collection, Ottawa.

What appears to be the allotype of this species hails from Teulon, Man., July 5, 1923, (A. J. Hunter).

***Sagaritis strigosus* n. sp.**

Related to *S. trackas* Viereck.

Female. Length 6 mm.; black, antennae black throughout, mandibles and palpi mostly yellowish, tegulae yellowish with a stramineous margin, fore coxae black, brownish stramineous at apex, mid and hind coxae black, proximal trochanters and hind distal trochanters mostly black, fore and mid distal trochanters mostly yellowish, femora reddish with a black stripe on the inner aspect, the mid and hind pair in addition black at base, fore and mid tibiae stramineous, the fore pair with a yellowish streak down the extensor surface, the extensor surface of the mid pair yellowish at base, then fuscous, then dark yellowish brown, fuscous at apex, hind tibiae blackish red, blackish at base, fore tarsi brownish, partly infuscated, mid tarsi darker than fore tarsi, hind tarsi black, abdomen black, a narrow reddish border at apex of second and third tergites, the succeeding tergites with the apical edge obscurely stramineous, plica yellow, with a black spot on each side of the third and fourth sternites; areola truncate at base, apparently as long as wide, confluent with the petiolarea, partly coarsely rugose like the petiolarea; sheaths of the ovipositor nearly twice as long as the apical truncature of the abdomen.

Male. Characters agreeing with those given for the female excepting as follows.—Fore and mid coxae black at base, partly yellow, fore and mid proximal trochanters mostly yellow, black above, hind distal trochanters yellow, mid femora reddish at apex, extensor surface of fore and mid tibiae yellowish, hind tibiae with their extensor surface mostly yellowish, blackish at base and apex; areola weakly, separated from the petiolarea.

Holotype—♀, Oliver, B. C., May 1, 1923, (C. B. Garrett); No. 1642 in the Canadian National Collection, Ottawa.

Allotype—♂, with the same data as the holotype but caught Apr. 27, 1923.

Paratypes—♀ ♀, data as in the holotype but collected Apr. 19 and May 2.

***Sagaritis gorhami* n. sp.**

Related to *S. dubitatus* Cresson.

Female. Length 9 mm.; black, antennae black throughout, mandibles black with the apical third blackish red, palpi blackish brown, all coxae, trochanters and femora as well as the rest of fore and mid legs black, tegulae black, with

a brownish stramineous margin, fore and mid femora dark stramineous at apex, fore tibiae brownish to blackish, their tarsi blackish brown, abdomen reddish except for the first segment and the basal three-fourths of the second tergite which are nearly entirely black, first tergite reddish at apex; areola smooth, truncate at base, nearly as wide as long, separated from the basal area, the latter transversely costate; sheaths of the ovipositor apparently twice as long as the apical truncature of the abdomen.

Holotype—♀, Annapolis, N.S., Oct. 9, 1923, (R. P. Gorham); No. 1636 in the Canadian National Collection, Ottawa.

***Sagaritis evansi* n. sp.**

Related to *S. californica* Holmgren.

Female. Length 5 mm.; black, antennae black, pedicel and first, second and third joints of the flagel brownish, mandibles mostly yellowish, tegulae yellowish with a pale stramineous margin, palpi stramineous fore and mid coxae reddish stramineous, hind coxae black, fore proximal trochanters mostly reddish stramineous, blackish above, mid and hind proximal trochanters mostly black, distal trochanters yellowish, fore femora reddish stramineous, mid and hind femora reddish, blackish at base, fore tibiae stramineous, their extensor surface yellowish-white, mid and hind tibiae reddish, fore tarsi reddish, mid and hind tarsi infuscated, apical joint of tarsi blackish, abdomen reddish, first segment except apical margin of its tergite, second tergite except an apical and lateral margin, base of third and fourth tergites all more or less black or blackish, plica yellowish; areola truncate at base, separated from the petiolarea, distinctly longer than wide, coarsely sculptured, petiolarea rugose, almost coarsely reticulate; sheaths of the abdomen nearly twice as long as the apical truncature.

Holotype—♀, Prince Edward Co., Ont., July 2, 1900, (Evans); No. 1643 in the Canadian National Collection, Ottawa.

Paratypes—♀ ♀, Jordan, Ont., Aug. 4, 1922, host *Metallus bethunei* MacG., July 7, 15, 1914, Aug. 5, 23, 1916 (W. A. Ross), Aug. 7, Sept. 7, 1919, (C. H. Curran); Ottawa, Ont., Aug. 6, 1914, (J. I. Beaulne), July 10, 29, 1916, (G. Beaulieu); Truro, N.S., Sept. 26, 1913, (W. H. Brittain); Saskatoon, Sask., June 22, 1923, (N. J. Atkinson); Kentville, N.S., Aug. 7, 1914, (C.A.G.).

Named in honor of Mr. J. D. Evans.

***Sagaritis nigricoxus* n. sp.**

Related to *S. evansi* Viereck.

Female. Length 7 mm.; compared with the original description of *S. evansi* Vier. this differs as follows.—Antennae black throughout, all coxae black, fore proximal trochanters mostly stramineous, black at base, mid proximal trochanters black with a whitish streak on the outer aspect, and a yellowish apical margin, hind distal trochanters partly black, partly yellowish, mid femora not blackish at base, extensor surface of fore tibiae yellowish, hind tibiae reddish, their extensor surface with the basal fourth mostly, the apical fourth entirely blackish, the space in between yellowish like the base of the extensor surface, abdomen black, the second and third tergites with an apical, obscurely reddish margin, apical margin of first tergite reddish stramineous, apical margin of the remaining tergites more or less reddish stramineous; areola nearly polished, finely reticulated.

Holotype—♀, Bilby, Alta., July 14, 1924, (O. Bryant); No. 1637 in the Canadian National Collection, Ottawa.

***Sagaritis rufiscapus* n. sp.**

Related to *S. evansi* Viereck.

Male. Length 6 mm.; compared with the original description of *S. evansi* as follows:—Flagel blackish brown, the scape and pedicel reddish brown, mandibles mostly yellowish stramineous, fore and mid trochanters stramineous, hind proximal trochanters black and reddish, all femora reddish throughout, fore and mid tibiae stramineous, the extensor surface palest, hind tibiae with the apical third reddish brown, the middle third yellowish, the basal third mostly blackish, yellowish at base, mid tarsi reddish, abdomen reddish, first segment, basal three-fourths of second and basal half of third tergite blackish, the remaining tergites more or less blackish above; areola poorly defined, nearly quadrate, finely reticulated.

Holotype—♂, Hastings Co., Ont., July 9, 1896, (Evans); No. 1638 in the Canadian National Collection, Ottawa.

***Sagaritis englishi* n. sp.**

Related to *S. evansi* Viereck.

Female. Length 6 mm.; compared with the original description of *S. evansi* Vier. this differs as follows. Antennae black throughout, fore proximal trochanter brownish and yellowish, mid proximal trochanters reddish and black with an apical yellowish margin, hind distal trochanters dark stramineous, mid femora not blackish at base, fore tibiae dark stramineous throughout, hind tibiae with their flexor surface reddish, their extensor surface blackish, fore tarsi blackish and stramineous, mid and hind tarsi blackish, abdomen black, tergites apically with a narrow, stramineous margin; abdomen fusiform not truncate, exserted portion of sheaths as long as the second tergite; areola finely reticulated, dullish, nearly twice as long as wide.

Holotype—♀, St. Johns, Newfoundland, (A. English); No. 1644 in the Canadian National Collection, Ottawa.

Named in honor of Mr. Arthur English.

***Sagaritis trochanteralis* n. sp.**

Related to *S. englishi* Viereck.

Female. Length, 4 mm.; black, antennae black throughout, mandibles mostly yellow, palpi pale stramineous, tegulae yellowish, with a nearly colorless margin, fore and mid coxae black at base, yellow at apex, stramineous in between, hind coxae and proximal trochanters black, the latter yellowish apically, fore and mid proximal and all distal trochanters yellow, rest of fore and mid legs stramineous with their tibiae partly whitish on the extensor surface, their tarsi from stramineous to blackish, hind femora darker stramineous than the mid femora and blackish at base, hind tibiae blackish near base and at apex, yellowish at base and in the middle, hind tarsi mostly blackish, abdomen black, apical edge of first tergite and an apical border of the second tergite yellowish, third tergite with a broader apical stramineous margin, the remaining tergites apically stramineous, their sides mostly stramineous, plica yellowish, sheaths of the ovipositor apparently one and one-half times as long as the apical trunca-

ture of the abdomen; areola complete, truncate at base, a little longer than wide, finely reticulated, petiolarea rugulose.

Holotype—♀, Ottawa, Ont., Aug. 26, 1908, (James Fletcher); No. 1645 in the Canadian National Collection, Ottawa.

***Sagaritis linearis* n. sp.**

Related to *S. nigricoxus* Viereck.

Male. Length 7 mm.; black, mandibles mostly yellowish and brownish, maxillary palpi with the basal joint mostly black, the second and third joints whitish, the fourth and fifth joints brownish, tegulae black, coxae black, proximal mid and hind trochanters as well as distal hind trochanter mostly black, distal mid trochanters brownish stramineous, mid and hind femora reddish with a black streak down the middle of the extensor surface, hind femora blackish at base, mid tibiae stramineous, the extensor surface mostly infuscated, with the middle third and base yellowish, hind tibiae reddish with the extensor surface blackish, mid and hind tarsi blackish, abdomen reddish, the first segment black with its tergite reddish at apex, plica yellowish and stramineous; areola truncate at base, nearly as wide as long, transversely costate like the petiolarea with which it is confluent.

Holotype—♂, Saskatoon, Sask., No. 16901 (K. M. King), No. 1674 in the Canadian National Collection, Ottawa.

***Sagaritis hoppingi* n. sp.**

Related to *S. californicus* Holmgren.

Male. Length 7 mm.; black, antennae black throughout, mandibles mostly yellow, palpi yellowish, tegulae yellow, with a nearly colorless margin, fore and mid legs excepting trochanters but including their coxae, stramineous, their trochanters yellowish, their femora rather reddish, their tibiae yellowish on the extensor surface, their tarsi beyond the basitarsus, brownish, hind coxae black hind proximal trochanter black with a pale apical margin, their distal trochanters stramineous, hind femora reddish with a blackish stain on the outer aspect near the base, hind tibiae blackish at base and apex, mostly stramineous, their tarsi black except the base of the first joint which is yellowish, abdomen black, the second tergite with the apical sixth reddish, third tergite with the apical fourth brownish stramineous, plica brownish; head expanded behind the eyes; areola and petiolarea confluent, transversely costate, the former truncate at base; post petiole posteriorly longitudinally lunate.

Holotype—♂, Midday Valley, Merritt, B. C., June 30, 1923, *Pinus ponderosa*, 17109, Lot. 1258, (R. Hopping); No. 1640 in the Canadian National Collection, Ottawa.

Named in honor of Mr. R. Hopping.

***Sagaritis septentrionalis* n. sp.**

Related to *S. websteri* Viereck.

Female. Length 6 mm.; black, antennae black throughout, mandibles mostly yellow, tegulae yellow with a nearly colorless margin, coxae black, fore and mid proximal trochanters mostly black, their apical half partly yellow, hind proximal trochanters black with a pale apical margin, all distal trochanters yellow, femora reddish, blackish at base, fore and mid tibiae and the first joint of

their tarsal joints stramineous, the extensor surface of their tibiae, mostly whitish, their outer tarsi brownish, flexor surface of hind tibiae reddish, their extensor surface whitish excepting near the base and at apex where it is banded with blackish colour, hind tarsi blackish excepting the base of the first joint which is yellowish, abdomen black, the first tergite pale at apex, the second tergite with the apical eighth brownish stramineous, plica yellowish; areola with only its basal three sides well developed, truncate at base, confluent with the petiolarea, partly finely reticulated, partly coarsely sculptured, petiolarea coarsely sculptured, almost transversely costate; sheaths of the ovipositor apparently twice as long as the apical truncature of the abdomen.

Holotype—♀, Nordegg, Alta., June 8, 1921, (J. McDunnough); No. 1648 in the Canadian National Collection, Ottawa.

***Sagaritis tibialis* n. sp.**

Related to *S. yakutatensis* Ashmead.

Female. Length, 7 mm.; black, antennae black throughout, mandibles mostly yellow, palpi pale yellowish, tegulae yellowish with a nearly clear margin, coxae black, proximal trochanters black with an apical yellowish margin, fore and mid distal trochanters yellowish, hind distal trochanters brownish, partly yellowish, fore femora reddish, mid femora reddish but darker than the fore femora and blackish at base, hind femora reddish, black at base and apex, fore tibiae stramineous with their extensor surface whitish, mid tibiae brownish, most of the extensor surface excepting the apical fifth, whitish, hind tibiae blackish, yellowish at base and with the middle two-fourths of the extensor surface whitish, fore tarsi pale brown, mid tarsi dark brownish, hind tarsi blackish, the basi-tarsi yellowish at base, abdomen black, the first tergite reddish at apex, the second apically with an obscurely reddish margin, plica brownish-yellow, areola truncate at base, distinctly longer than wide, finely reticulated, barely separated from the petiolarea, the latter transversely, weakly costate; sheaths of the ovipositor nearly two-thirds the length of the fusiform abdomen.

Holotype—♀, Okanagan Valley, B. C.; No. 1650 in the Canadian National Collection, Ottawa.

***Sagaritis chrystali* n. sp.**

Related to *S. tibialis* Viereck.

Female. Length 6 mm.; compared with the original description of *S. tibialis* Vier. this differs as follows.—Fore and mid proximal trochanters yellowish, black at base, hind distal trochanters yellowish, mid and hind femora not blackish at base, flexor surface of hind tibiae reddish, mid tibiae mostly stramineous, first tergite stramineous at apex, the second tergite black throughout; areola narrowly truncate at base, nearly heart-shaped; abdomen truncate, sheaths of the ovipositor a little longer than the truncature.

Holotype—♀, Cowly, Alta., June 18, 1918, (R. N. Chrystal); No. 1651 in the Canadian National Collection, Ottawa.

Named in honor of Mr. R. N. Chrystal.

***Sagaritis kingi* n. sp.**

Related to *S. chrystali* Viereck.

Female. Length, 5 mm.; compared with the original description of

S. tibialis Vier. this differs as follows.—Fore, mid and distal hind trochanters yellowish, mid and hind femora not blackish at base, fore and mid tibiae stramineous with their extensor surface partly whitish; the mid tibiae with a brownish annulus near the base, flexor surface of hind tibiae reddish, blackish at base, fore and mid tarsi mostly stramineous, the latter with the fourth and fifth joints mostly brownish, apical margin of first tergite, stramineous, apical fourth of second tergite reddish like the apical fourth and part of the sides of the fifth, sixth, seventh and eighth tergites along the lower edge of their sides mostly reddish, partly stramineous, plica yellowish; areola truncate at base, its boundaries trenchant, nearly as wide as long, finely sculptured, separated from the petiolarea which is rather coarsely transversely wrinkled; abdomen subtruncate, its sheaths nearly twice as long as the apical truncature.

Holotype—♀, Saskatoon, Sask., Sept. 18, 1923, 16410, 2N11C., (Kenneth M. King); No. 1649 in the Canadian National Collection, Ottawa.

Named in honor of Mr. K. M. King.

(To be Continued)

BOOK NOTICE.

A List of British Aphides.—By J. Davidson, Rothamsted Experimental Station, Harpenden, England—Published by Longmans, Green & Co., 39 Paternoster Row, London, E. C. 4.

This work on British Aphidoidea will be of great service as a reference list to all students of aphides. It contains 176 pages and is divided into four main sections.

In Section I, a list, arranged alphabetically, is given of all the known British species and their important synonyms (397 valid species, and 178 synonyms), together with their distribution and food plants as recorded in Britain. With certain migratory species, the primary and secondary host plants are indicated by the numerals I and II respectively,—e.g. *ribis* (L.) I *Ribes*. II *Labiateae*; but in the case of other species with alternate host habits such as *lanigerum* (Hausm) and *humuli* (Schr) no distinction is made between the primary and secondary host plants. An appendix to Section I contains species of Walker and some others recorded from Britain, which the author has been unable to place, owing to insufficient descriptions.

In Section II the genera are listed alphabetically, together with some critical notes and important synonyms. Section III is a food plant index of British aphides, with the generic names of the plants arranged in alphabetical order. The plant names used by the author are in large part in accordance with Babington's "Manual of British Botany," 10th edition. In Section IV a bibliography of the Aphidoidea is given. This list is not exhaustive, but it includes references to the most important literature dealing with the biology and systematic study of aphides.

6.

rs
n-
sh
re
ats
of
th,
tly
ud-
he
te,
eth

ntal
ter-

ence
our

own
sy-
ain.
in-
ab-
rum
and
lker
e to

some
x of
etical
with
blio-
udes
ema-